

Developing Image-based Measurements to Characterize Stem Cells Cultured as Colonies

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Abstract— Induced pluripotent stem cells (iPSC) are capable of differentiating into almost any cell type and have promise in being used in cellular therapies and as personalized medicine diagnostic tools. Although iPSC are grown in many laboratories, there have been few strategies developed to measure the culture phenotype and show that the phenotype does not change as the cells are being used in experiments. We developed an image-based culture characterization procedure that takes advantage of counterstaining iPSC colonies with maleimide stains. This stain serves as a total protein/colony stain and allows an antibody stain to be presented as a fraction of total protein in each colony. Large field of view imaging ensured adequate sampling of the colonies in the cultures and allowed generation of signature metrics that describe the culture phenotype. This measurement strategy could be useful for generating reference data and specifications for ensuring an iPSC line has the expected phenotype before experiments are executed.

Index Terms—stem cell therapy, imaging, phenotype measurements, quantitative fluorescence microscopy